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APPLY PESTICIDES CORRECTLY
A GUIDE FOR COMMERCIAL APPLICATORS

SEED TREATMENT

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PREFACE

Federal regulations establish general and specific standards that you must meet before you can use or supervise the use of certain pesticides. Your State will provide material which you may study to help you meet the *general* standards.

This guide contains basic information to help you meet the *specific* standards for applicators who are engaged in seed treatment pest control. Because the guide was prepared to cover the entire nation, some information important to your State may not be included. The State agency in charge of your training can provide the other materials you should study.

This guide will give you information about:
- types of seeds that may require chemical protection against pests,
- seed treatment pesticide formulations,
- seed treatment methods,
- labeling treated seed, and
- safety and environmental precautions.

INTRODUCTION

Seed treatment, as defined by the Federal Seed Act, means: ". . . given an application of a substance or subjected to a process designed to reduce, control, or repel disease organisms, insects, or other pests which attack seeds or seedlings growing therefrom." It includes control of pests while the seed is in storage and after it has been planted.

A person treating seed should know:
- the kinds of seeds which should be treated, and
- the correct use of seed treatment pesticides.

The kinds of pesticides used vary according to locality. Get specific information from the local Cooperative Extension Service or the pesticide manufacturer. Registered chemical products are effective and safe when used as directed.

Match each seed treatment pesticide with equipment that can apply it correctly. The manufacturer can provide you information on how to use and maintain the equipment.

SEEDS COMMONLY TREATED

The kinds of seeds usually treated include:
- wheat,
- barley,
- rye,
- oats,
- rice,
- sorghums and sorghum-Sudan grass hybrids,
- field corn and sweet corn,
- cotton,
- sugar beets,
- soybeans,
- sunflowers,
- peas and beans, and
- peanuts.

SEED PESTS

Major kinds of seed pests are:
- fungi and bacteria (such as seed rots, seedling blight, and smuts of grains),
- soil insects (such as the seed corn beetle and wireworms), and
- storage insects (including weevils, moths, and beetles).

NONCHEMICAL CONTROL OF PESTS

Although most seed protection is done with chemicals, you also should know about nonchemical methods, such as:
- development of plant and crop varieties whose seeds are resistant to pests,
- use of low humidity and low temperature in storage areas to inhibit the growth of bacteria, mold, and mildew, and to slow the growth of insect pests, and
- use of good sanitation practices (such as removing waste seed and seed particles from the storage area) to reduce food and shelter for pests.

CHEMICAL CONTROL OF PESTS

There are three types of chemical control for seed diseases and insects:
- Seed surface disinfestation—complete covering of the seed with a pesticide which kills spores and other disease agents on the surface of the seed.
- Seed protection—applying a pesticide to the seed to protect the seed and young seedling from disease agents or insects in the soil or in storage.
- Systemic treatment—applying a pesticide which penetrates the seed and/or extends into the plant as it grows. It repels or kills certain types of fungi or insects, or keeps them from causing damage.

SEED TREATMENT FORMULATIONS

ACTIVE INGREDIENTS—The label lists the names of all active ingredients and tells what percent of the formulation each makes up.

INERT INGREDIENTS—Seed treatment pesticide formulations often contain carriers, binders, wetting agents, emulsifiers, suspending agents, and dyes. These materials are inert ingredients, which do not have to be listed individually on the label. They are added to the formulation to:
- improve appearance,
- increase coverage,
- increase adherence,
- prevent dusting-off, and
- provide hazard recognition.

They have little or no effect on seed germination.

TYPICAL SEED TREATMENT PESTICIDE FORMULATION

Active Ingredient:	Chemical Name	80%
Inert Ingredients:	Wetting Agent	3%
	Dyes	2%
	Suspending Agents	3%
	Carriers	6%
	Stickers	2%
	Oils	4%
Total:		100%

COMPATIBILITY—Most seed treatment pesticides are compatible when mixed together. Consult the pesticide label or the pesticide manufacturer for compatibility information. To test compatibility, make a small slurry mixture of the materials in the correct ratio before starting the actual mixing.

Check compatibility information before applying a pesticide to inoculated seed.

PESTICIDE LABELS

Before using any seed treatment pesticide, read and analyze the information on the label. The label contains detailed information about:

- active ingredients,
- safety precautions,
- antidotes,
- type of seed the pesticide can be used on,
- application rate,
- pests the product will control, and
- care in handling and use of treated seed.

APPLICATION EQUIPMENT

Commercial seed treaters are designed to apply accurately, measured quantities of pesticides to a given weight or volume of seed. Too much of a pesticide may injure seed, and too little is often not effective.

To perform accurately, a seed treater:

- must be adjusted correctly at all times, and
- must be given continuous preventive maintenance.

Check often during use to see that the amount of formulation that has been used is in the correct proportion to the amount of seed that has been treated.

There are three basic types of commercial seed treaters:

LIQUID TREATERS—for all formulations not requiring agitation during application.

Advantages:

- no agitation needed,
- pesticide can be pumped directly from pesticide container into equipment,
- machines require less space than other types,
- give good seed penetration.

Limitations:

- limited to liquid pesticide formulations,
- useful mainly on cottonseed and small grains,
- require a fume collection system.

SLURRY TREATERS—for formulations requiring agitation during application.

Advantages:

- can be used to treat many seed types and varieties,
- give good coverage and are accurate,
- are economical.

Limitations:

- pesticides used need vigorous and continuous agitation,
- require a dust and/or fume collection system,
- limited to wettable powders or emulsifiable concentrates.

DUST TREATERS—for dry formulations.

Advantages:

- add no moisture to the seed,
- easy to clean and operate.

Limitations:

- limited to dust formulations,
- sometimes inaccurate,
- dust drifts easily.

The operator's manual supplied by the manufacturer will guide you in the correct use and maintenance of the equipment.

COLORING TREATED SEED

Food and Drug Administration regulations require that all food grain seeds treated with seed treatment pesticide formulations be dyed to prevent their use as food or feed.

Most seed treatment pesticides for in-plant use come from the manufacturer with the color added. Coloring is not required for planter-box formulations. Some seed processors prefer to add more dye to get

the color they want. Dyes approved for this purpose have little or no effect on seed germination and present little or no danger to people who process or use the seed.

LABELING TREATED SEED

The Federal Seed Act regulates the labeling of treated seed. (See Appendix.) The following information, in type no smaller than 8 points, is required on treated seed containers:

- A statement indicating that the seed has been treated.
- Name of the seed treatment pesticide used—either the common name, chemical (generic) name, or abbreviated chemical name.
- Seed treated with highly toxic substances requires a label bearing a skull and crossbones and a precautionary statement, such as "This Seed Treated With Poison." The skull and crossbones must be at least twice the size of the type on the label. The precautionary statement must be in red letters on a contrasting background.

THIS SEED TREATED WITH POISON
Treatment Used: Phorate

Federal Seed Act regulations contain a list of the substances considered highly toxic.

- Seed treated with most substances not on the highly toxic substances list requires a label with an appropriate precautionary statement, such as "Do not use for food, feed, or oil purposes."

This Seed Treated With Captan
Do not use for food, feed or oil purposes

Federal Seed Act regulations list the treatment substances and rates of occurrence for which no warning statement is necessary.

This information may appear on a separate tag or seed analysis tag, or it may be printed conspicuously on the side or top of the seed container. These are minimum labeling requirements. Some seed treatment pesticide labeling recommends additional information that should be added to the label on the treated seed. You also should check for your own State's requirements for these treated seed container labels.

SAFETY AND ENVIRONMENTAL PRECAUTIONS

Some suggested precautions for seed treatment include:

- The seed treatment area should have an approved exhaust and dust-collecting system to remove toxic vapors and dust. Do not allow pesticide dust or fumes to reach unprotected employees or to reach commodities to be used for food, feed, or oil purposes.
- To avoid contaminating seed with an incorrect pesticide, the seed treating equipment must be throughly cleaned before the treating process begins. Consult the pesticide manufacturer for the names of cleansers and directions for their use.
- Do not run water containing pesticides into a stream or public sewer. Handle it as you would an excess pesticide. Check with local authorities when you have large amounts of such waste water.
- Dispose of empty treated seed containers and unused treated seed as you would excess pesticides. Contact the Board of Health or other local authority for requirements and disposal areas.
- Special tightly woven bags, or polyethylene or foil-lined bags, are recommended for seed that have been treated with some highly toxic pesticides.
- Handle treated seed in accordance with instructions on the label of the pesticide that was applied to the seed.
- Store treated seed in labeled containers away from unprotected persons and food or feed products. Treated seed must never be mixed with food and feed products.
- Provide customers with copies of pertinent labeling information for the pesticide applied.

APPENDIX

The production of organo mercurial pesticides for seed treatment was prohibited by EPA on February 17, 1976. However, stocks formulated prior to that date may be sold and used until exhausted. Further action by EPA and other interested parties is to be anticipated.

The following is excerpted from the Federal Seed Act (Title 7, Ch. I, Part 201 of the Code of Federal Regulations), for specific information about labeling of treated seed.

LABELING IN GENERAL

201.31a Labeling treated seed.--(a) *Contents of label.*—Any agricultural seed or any mixture thereof or any vegetable seed or any mixture thereof, for seedling purposes, that has been treated shall be labeled in type no smaller than 8 points to indicate that the seed has been treated and to show the name of any substance or a description of any process (other than application of a substance) used in such treatment, in accordance with this section: for example,

Treated with .....
(Name of substance or process)
or ..... treated.
(Name of substance or process)

If the substance used in such treatment in the amount remaining with the seed is harmful to humans or other vertebrate animals, the seed shall also bear a label containing additional statements as required by paragraphs (c) and (d) of this section. The label shall contain the required information in any form that is clearly legible and complies with the regulations in this part. The information may be on the tag bearing the analysis information or on a separate tag, or it may be printed in a conspicuous manner on a side or top of the container.

(*b*) *Name of substance.*—The name of any substance as required by paragraph (a) of this section shall be the commonly accepted coined, chemical (generic), or abbreviated chemical name. Commonly accepted coined names are free for general use by the public, are not private trademarks, and are commonly recognized as names of particular substances: such as thiram, captan, lindane, and dichlone. Examples of commonly accepted chemical (generic) names are: bluestone, calcium carbonate, cuprous oxide, zinc hydroxide, hexachlorobenzene, and ethyl mercury acetate. The terms "mercury" or "mercurial" may be used in labeling all types of mercurials. Examples of commonly accepted abbreviated chemical names are: BHC (1,2,3,–4,5,6,-Hexachlorocyclohexane) and DDT (dichloro diphenyl trichloroethane).

(*c*) *Mercurials and similary toxic substances.*—(1) Seed treated with a mercurial or similarly toxic substance, if any amount remains with the seed, shall be labeled to show a representation of a skull and crossbones at least twice the size of the type used for information required to be on the label under paragraph (a) and shall also include in red letters on a background of distinctly contrasting color a statement worded substantially as follows: "This seed has been treated with Poison," "Treated with Poison," "Poison treated," or "Poison." The word "Poison" shall appear in type no smaller than 8 points.

(2) Mercurials and similarly toxic substances include the following:

Aldrin, technical
Demetron
Dieldrin
p-Dimethylamino-benzenediazo sodium sulfonate
Endrin
Ethion
Heptachlor
Mercurials, all types
Parathion
Phorate
Toxaphene
O-O-Diethyl-0-(isopropyl-4-methyl-6-pyrimidyl) thiophosphate
O,O-Diethyl-S-2-(ethylthio) ethyl phosphorodithioate

Any amount of such substances remaining with the seed is considered harmful within the meaning of this section.

(*d*) *Other harmful substances.*—If a substance, other than one which would be classified as a mercurial or similarly toxic substance under paragraph (c) of this section, is used in the treatment of seed, and the amount remaining with the seed is harmful to humans or other vertebrate animals, the seed shall be labeled with an appropriate caution statement in type no smaller than 8 points worded substantially as follows: "Do not use for food," "Do not use for feed," "Do not use for oil purposes," or

"Do not use for food, feed, or oil purposes." Any amount of any substance, not within paragraph (c) of this section, used in the treatment of seed, which remains with the seed is considered harmful within the meaning of this section when the seed is in containers of more than 4 ounces, except that the following substances shall not be deemed harmful when present at a rate less than the number of parts per million indicated:

Allethrin—2 p.p.m.
Malathion—8 p.p.m.
Methoxychlor—2 p.p.m.
Piperonyl butoxide—8 p.p.m. on oat and sorghum and 20 p.p.m. on all other seeds.
Pyrethrins—1 p.p.m. on oat and sorghum and 3 p.p.m. on all other seeds.

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